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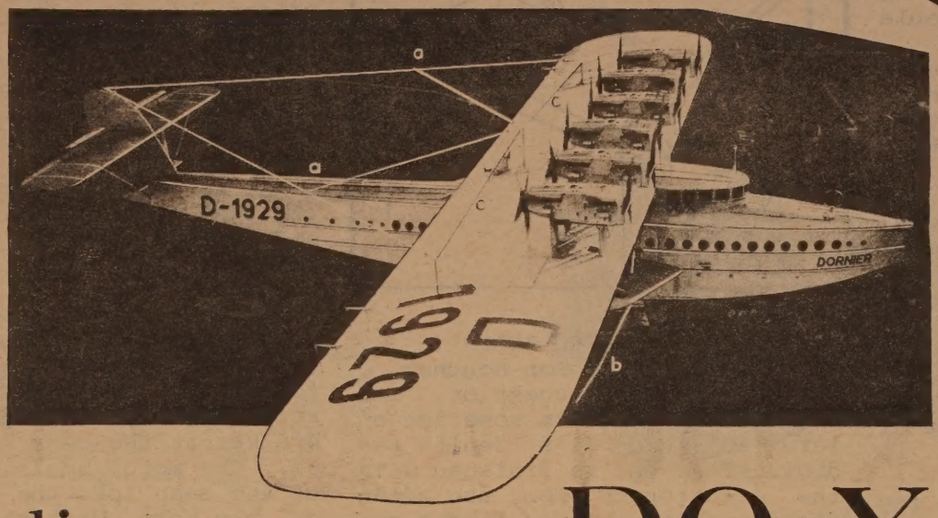
THE NEWSPAPER FOR
THE HOBBYIST OF VINTAGE
ELECTRONICS AND SOUND

THE HORN SPEAKER

RADIO NEWS FOR MARCH, 1931



Radio *Aboard the* DO-X

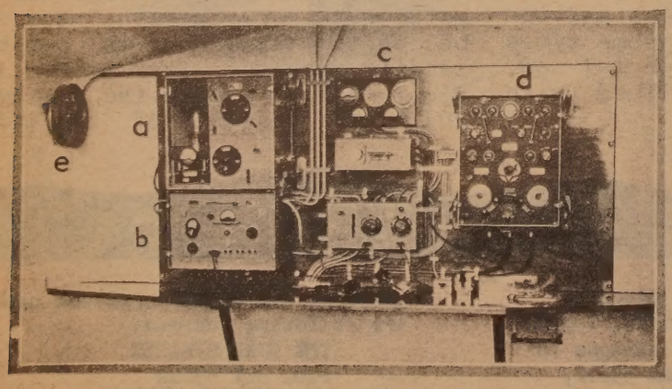
The Largest Flying Boat in the World Employs Three Antenna Systems, Two Transmitters and a Multi-Wave Receiver to Maintain Radio Contact with Ship and Shore Stations

WHEN the mammoth German transatlantic airliner, Dornier DO-X, leaves European shores on its contemplated flight to South America, it will maintain constant communication with both its taking-off place and destination, to say nothing of the contacts with numerous ships overtaken on its course, by means of two transmitters and an elaborate receiving system. This radio installation is probably the most pretentious ever included in any airplane.

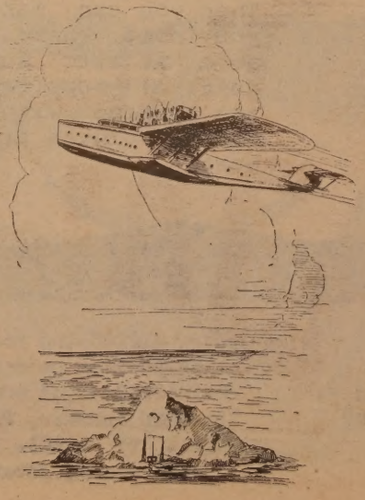
In one of the cabins on the upper deck (the DO-X has three decks) is located all of the transmitting and receiving apparatus. Along the upper surface of the main wing and extending back to the tail are two antennas, while from the hull a trailing wire antenna may be lowered. In addition, in the bow of the hull, a loop antenna is installed for direction-finding purposes.

The two transmitters are used for different purposes. One is a long-wave transmitter rated at 120 watts, covering a wavelength of 550 to 2,300 meters. Communication with it may be carried on on either telephony, straight cw. or icw., so that vessels along the course of the flight may be contacted. This transmitter is the more generally used of the two, being employed mainly for routine commercial message handling. The other transmitter is for long-distance work and is of the short-wave, crystal controlled type, working on a waveband of from 25 to 80 meters. Its power is rated at 10 watts.

Besides housing the transmitting apparatus, this cabin also contains the receiving equipment, which consists of a flexible circuit arrangement employing seven tubes in all. This receiver covers a waveband of from 25 to 3,000 meters, the one receiver being used for either short- or long-wave communication. Precautions have been taken in the installation of the receiver to make it quite insensitive to shock and vibration set up by the twelve motors with which the plane is powered.



The radio cabin aboard the giant airliner DO-X. "A" shows the long-wave transmitter; "B" the short-wave transmitter; "C" the switchboard and indicator instruments; "D" the all-wave receiver, and "E" the reel for the trailing antenna

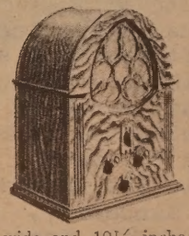


Antenna Systems Unique

The antenna system is unique. For transmission on long waves either the trailing wire antenna (B) or one of the fixed antennas (A) or (C) may be used. A measured wire forms the antenna for short-wave transmission. Any one or all three antennas may be used for reception.

Power for the transmitters and the receiver is obtained primarily from a wind-driven generator which, when the plane is not in flight, may be actuated by a small 14-horsepower Benz motor.

"Little General" Receiver



A new small six-tube a.c. screen-grid set in three styles of finish, to be known as the "Little General," has been announced by General Motors Radio Company at Dayton, Ohio.

Only 19 inches high, 16 inches wide and 10½ inches deep, the "Little General" is finished in three optional colors, genuine butt walnut, or lacquered in green or buff. The receiver is equipped with tone selector using the continuously variable type which permits smooth shifting from bass or treble without interruption. The speaker is of the electro-dynamic type. Four type –24 screen-grid tubes are employed, three being used in the radio-frequency stages and one as a power detector. One type –45 tube is used in the power output stage, while the rectifier is of the –80 type. The new set uses four tuned circuits; dual volume control.

letters

Dear Jim,

Just wanted to let you know my March issue of THE HORN SPEAKER arrived today, April 3. I called Radio Americana about their large two page ad only to find out most items are gone as my paper is about three weeks late.

From talking with him I find out there were many people who got their paper late.

I realize it probably isn't your fault, but if enough subscribers complain in writing maybe you can shake up the Post Office.

Alvin

EDITOR...Please let your local Post Office know that you sincerely want to receive THE HORN SPEAKER as soon as possible.

Dear Jim,

I sure have some explaining to do. I received your notice of subscription ending back in September or October.

I had decided to drop a few things this year since my interests are changing.

My interest has been lately to work countries via ham radio so the hobby of old radios has been put aside.

In January I received notice that the Canadian Vintage Wireless Association was folding. I was never able to attend the meetings so I thought I'd put my money in a local group.

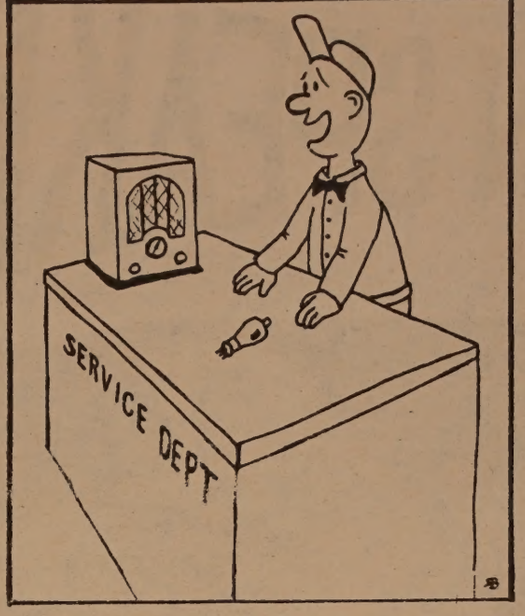
I thus attended the February meeting of The Puget Sound Antique Radio Association in Seattle. It has now sparked my interest in the old again.

Please renew my subscription from whenever it ran out and extend for two years.

Thanks for understanding.

Sincerely,
Joseph Sabo
2330-171st Pl. S.E.
Seattle, WA 98011

SHOP TALK



ZENITH TUNING BELTS
by Ron Boucher

Here's a suggestion for the reader who works sometime on late 30's and 40's Zenith radios. After you're finished with the electronics you are often faced with having to find a replacement rubber drive belt that is used in the tuning mechanism. If you don't get into these sets too often, you can use an "O" ring, which can be purchased at many automotive supply outlets. In order to determine the size you need, use a string to measure the length belt you need and divide by 3. This will give you the diameter (inside) of "O" ring you need, and give you a little stretch to make a snug fit. A 1/8 inch thick ring is just about right.

If you do get into these Zeniths often you might want to invest in a "do it yourself" made to order "O" ring kit. Then you can make any size belt you need. These are also available at auto suppliers and industrial suppliers. Some types are spliced with a special adhesive, others are spliced with heat.

Victrola

EVOLUTION OF THE
VICTOR VICTROLA VV-IV
by
Walter Sanders
Terre Haute, IN

The introduction of the Victor Victrola VV-IV with its inside horn in 1906 was the beginning of the end of the outside horn machines. Produced for nearly two decades as the lowest priced Victor, it underwent a number of changes. Figures 1 through 5 show four versions of the IV, and its successor, the Victrola 1-1 of 1925.

The early models are easily distinguishable by: (1) the crank is in a foward position; (2) the louvers tilt downward; and (3) the tone arm bracket attaches to the top of the case at the rear. These were changed in later models as a result of two major internal changes. First, in the early models the horn was formed by two vertical boards spreading out from the tone arm bracket at the rear (see Figure 6). The motor board and bottom of the case form the other sides of the horn. With this arrangement, the motor is inside the horn near the front of the cabinet. By tilting the louvers downward the motor is hidden from view.

A redesigned motor that was deeper at the rear and shallower at the front permitted the insertion of an independent horn. As shown in Figure 7, this necessitated a change in the bracket, and permitted the louvers to be tilted upward for better deflection of the sound. This also moved the crank to the rear of the cabinet.

As shown in the photos, Victor seemed to be playing "musical chairs" with the off-on switch and the speed regulator. The design of the early motor requires the regulator to be at the rear, but it can be readily changed from left to right by reversing the control shaft. The position of the gov-

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ernor in the later motor requires the regulator to be in front. In both cases, once the speed regulator is positioned there are three corners left for the off-on switch. I suppose this was varied arbitrarily from year to year.

Less obvious are changes in cabinet size. Generally, the size increased slightly in later years, probably to accomodate larger motors. Also, the latest version shown, a VV-IVA, has quite a different motor board with an inset. And, the tone arm and elbow connection was changed in the later versions so that an ordinary screw holds the two pieces together. Finally, there are several versions of the part that holds the tone arm to the rear bracket.

Construction of the Victrola 1-1, successor to the VV-IV and shown in Figure 5, is obviously cheaper than that of the VV-IV. The tone arm was altered to eliminate one part, the doors and louvers were eliminated and replaced by a slotted front to the cabinet, and there is no bottom cover (the information tag is pasted on the bottom of the horn). The cabinet of the Victrola 1-1 pictured is mahogany, whereas all the VV-IV I have seen are oak.

Fig. 1: May 1, 1912

Fig. 2:

January 1, 1915

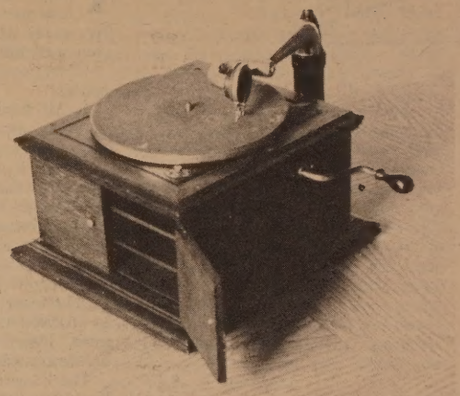


Fig. 4: IVa

April 1, 1918

Fig. 3: no date

Fig. 5: Victrola 1-1

April 20, 1925

RADIO NEWS FOR MARCH, 1931

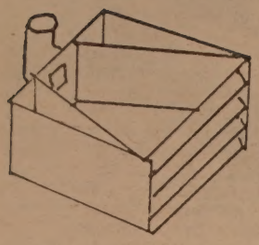


Figure 6. Early VV-IV horn arrangement.

The Service Bench

by ZEH BOUCK

Discussing hum, noise, intermittent reception, time payments and service, magnetic speakers, phonograph pickups, fading signals. Receivers serviced: Majestic, Amrad, Crosley, Radiola, Temple, Zenith

IN the last appearance of the "Service Bench," we published a description of a vacuum tube voltmeter calibrated especially for the quantitative determination of hum. This device will be particularly useful in practising the procedure outlined in the following article.

Hum Hunting

By Boris S. Naimark

IT is generally conceded that no receiver is entirely free from hum. However, this hum may be of such a low value that it is not objectionable. Unfortunately, one often encounters cases where the hum attains an abnormal value, and the source of hum must then be quickly localized and remedied.

Objectionable hum may be due to any one of the following causes:

1. Mechanical; 2. Faulty adjustment of the hum balancers; 3. Poor tubes; 4. Induction; 5. Current supply; 6. Insufficient filtration; 7. Defective parts and circuits.

We have placed the mechanical causes of hum at the head of the procession, not because they are the most common instance of hum, but because they are probably the easiest to locate. If the hum is accompanied by a simultaneous mechanical vibration within the power supply section of the receiver, it may be assumed that the hum is due to a mechanical defect, generally loose laminations in the power transformer. Remove the transformer from the receiver assembly, and in a pan heat it slowly in an oven until the sealing compound adheres to the laminations. Allow the transformer to cool for at least twelve hours before returning it to the receiver.

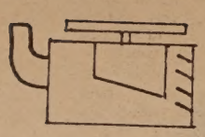
The incorrect adjustments of hum balancers, when such adjustments are provided, cause a great deal of trouble. Hum balancers generally consist of potentiometer type resistors connected across the filament supply windings, the center taps being returned to ground. If a receiver hums badly, and hum adjustment is possible, the balancers should be adjusted before looking elsewhere for trouble. With only one balancer, the adjustment is extremely simple. A screw-driver is engaged in the movable arm slot, and is turned carefully until a point of minimum hum is achieved. In sets having more than one hum adjustment a certain sequence in the order of adjustment must be observed. The majority of receivers have three hum adjustments, one across the detector tube filament, one across the filaments of the radio-frequency amplifying tubes and the third across the power stage filament.

First remove the detector and first audio tubes from their sockets, and adjust the power stage potentiometer. Replace the first audio tube, and adjust the radio-frequency hum balancer. Lastly replace the detector tube and vary the third potentiometer for a similar minimum. Where there are only two adjustments to be made, the detector potentiometer should always be the last one adjusted. The detector tube should be removed from the socket when the other balancer is being adjusted.

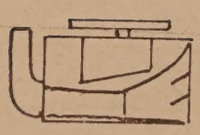
Poorly matched tubes will cause an objectionable hum when used in a push-pull stage. Low emission rectifier tubes also account for their share of hum.

Tubes in the detector and first audio sockets are, perhaps, the greatest offenders, and in the order mentioned. While quick heater tubes have been developed that are relatively hum free, there is a margin of safety, in our opinion and experience, in employing slow heater tubes.

A simple procedure enables us to determine whether hum finds its origin in the detector or first audio tubes. Detune the receiver and listen carefully for hum. Remove the detector tube and note the difference, if any. If the hum is minimized more than a negligible degree, the detector tube is at fault and

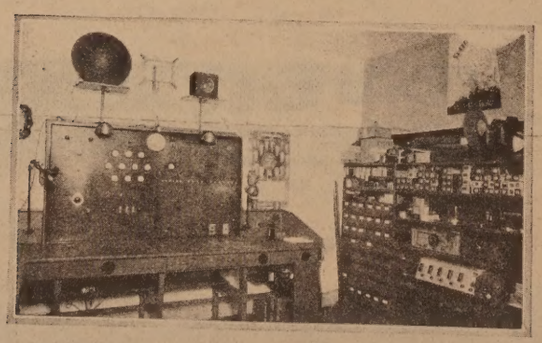


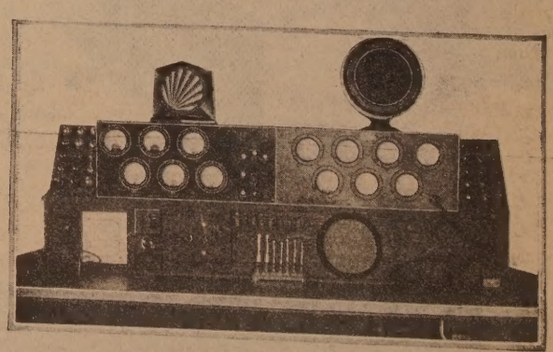
(a) Early VV-IV



(b) Late VV-IV

Figure 7. Motor, bracket, and horn arrangement.





Hum tracing apparatus is incorporated in these modern and efficient service benches. Left—Radio Studios, Inc., Tuckahoe, N. Y. Right—The Radio Specialty Service, Mobile, Ala.

should be replaced. Make the same test with the first audio tube. When maneuvering these tubes, it is often desirable to disconnect the aerial, and listen for hum with the volume control at various settings.

Hum originating in the radio-frequency tubes is rarely apparent when not tuned to a carrier. However, a tunable hum is frequently due to the generator in the broadcasting station. Tune in as many strong arriers as possible. If hum is bad on all of them, it is a safe assumption that the fault lies in the r.f. section of the receiver.

Induction hums, in the modern compact receiver, offer serious problems which tend to be emphasized by the advent of the mantelpiece receiver. Offenders in this respect are the power transformer, rectifier tubes, associated leads, the first choke coil in the filter system and a.c. dynamic speakers in proximity to the detector and first audio stages. Quite often hum results from poorly filtered current being used to energize the speaker field.

It is suggested that a magnetic speaker be used temporarily with a receiver having an objectionable hum. The substitution will enable you to estimate the proportion of hum due to induction from the dynamic speaker. (Ed. Note: Make due allowance for the reduction in low note and hum response of the magnetic speaker.) Excessive hum is occasionally due to worn-out dry rectifiers.

By shorting the grid input to the second or power stage, additional hum in the loud speaker would indicate induction from the output transformer, the last audio tubes or the filter.

Induction hums may be reduced and eliminated by effectively shielding the first audio and detector circuits from the influence of the power transformer and filter circuits.

It is well known that the detector input circuit, particularly where grid leak and condenser detection is employed, is susceptible to electrostatically induced hum. To determine the amount of hum due to static induction in the detector circuit, the grid leak should be temporarily shorted. A reduction in hum should be noted. To minimize static induction at this point, the best practice is to rewire the grid connection so that both grid condenser and leak are mounted close to the grounded chassis as possible without upsetting the balance of the tuning condenser.

In fishing for hum reduction, always try reversing the a.c. plug.

Hum due to imperfect apparatus or circuits may be detected by visual inspection or careful circuit continuity tests. Shorted choke coils, open condensers, poor ground connections, shorted or open filament potentiometers all result in abnormal hum.

The more advanced students of radio technology, and I hope all good servicemen belong in this category, will be interested in the article by B. F. Miessner, appearing in the January, 1930, issue of the *Proceedings of the Institute of Radio Engineers*, entitled "Hum in All-Electric Receivers."

THE utility of the test-set cannot be questioned. It is as useful to the serviceman as the stethoscope is to the physician. But many servicemen are too eager to apply the test-set without a simple preliminary examination that might be quite as illuminating as the more involved testing of each tube and voltage. For instance, in a dead receiver, a tap on the detector tube will inform the expert where to start with his test-set—in the r.f. or a.f. section. And there are other tests which, performed before individual socket analysis, will save time and needless labor in many service calls.

Freak Reception on a Temple

W. L. Morley, chief service engineer with the Temple Corporation, tells one on his own receiver that applies equally well to many other makes.

"Cases are occasionally reported where, when a loud signal is tuned in, the set will suddenly go dead, but immediately start operating again if it is retuned. I have discovered that this condition is due to the collection of a fine metallic dust between the condenser plates, causing an electrostatic short at irregular intervals. This trouble should not be encountered on Temple receivers having a serial number over 8000, and in any case is easily remedied by cleaning between the plates with a pipe cleaner."

-27 Filaments and Poor Connections

J. Paul Miller, custom set-builder and general radio retailer of Philadelphia, sends in the following notes on intermittent reception and noise:

"Watch for cracked filaments in the -27 type of tube in cases of intermittent reception. You can generally see the tube light up and then go out, like a thermostatic blinker.

"Noisy volume controls can be cleaned by the judicious application of graphite. Rub a drawing pencil over the winding, and tighten up the tension of the spring arm.

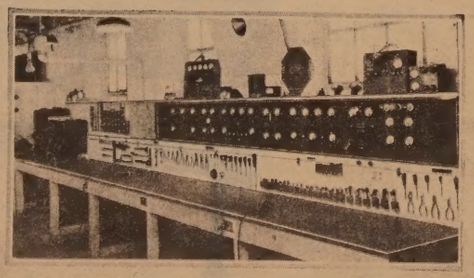
"I was temporarily stumped by a service call on a Zenith. The complaint was noisy reception and sudden fading. When I called, everything seemed okay, including all voltages, tubes and reception in general. But when the owner tried his radio that same evening, the usual fading was in evidence, resulting in a hurry service call. When I arrived the set was nearly dead, and none of the usual tricks seemed to do any good. Upon inspecting the lightning arrester, I discovered that the antenna and lead-in were spliced, originally being held together with a nut and bolt which, in the course of years, had disappeared. The connection now was badly corroded and decidedly microphonic. This explained the fading, the resistance of the joint varying as the antenna swung in the wind.

"In similar cases now, the antenna is inspected before the set itself."

Another Soldered "Joint"

"A Murad Super Six receiver was brought into my laboratory with a chronic case of fading, loss of volume and noisy reception. The usual mechanical and electrical tests failed to reveal the trouble. The volume control was inspected for a perfect wiping contact, and was found in good condition. However, while handling the volume control, the signals suddenly faded out. A second motion of the volume control brought the signals in again, localizing the trouble in this, so often guilty, piece of apparatus. The small soldering tap which connects with the shell of the volume control had broken loose, and the connection was highly microphonic and badly oxidized. This was resoldered and the receiver functioned perfectly evermore.

HERBERT F. BROOKS,
Authorized Silver-Marshall Service, Hackensack, N. J."



Where neatness and efficient arrangement contribute to the facility and dispatch of servicing. The service laboratory of the B. K. Sweeney Electrical Company, Denver, Colo.

More Thermostatic Effects

One of our old reliable contributors, H. W. Huddleson, of H. W. Huddleson and Son, Auto and Radio Service and Merchandise, of Vandalia, Mo., keeps the ball a-rolling:

"Nearly all of the troubles with which we have had to contend in radio equipment of recent manufacture has been tube trouble. The complaint has been noise, or else our clients have said that reception was loud but not clear. We have also had a few complaints on fading of near-by stations.

"Several complaints have come from Majestic owners that their sets would stop operating for a short time every once in a while. In almost every case we found that the grid support wire was located very close to the cathode of the -27 tube, and the close point is nearly always at the lower end of the cathode—that is, near the glass stem. We have also found -45 tubes that are responsible for a similar complaint, and in one instance, a -26 tube caused the same trouble. It seems that the elements are shifted slightly at a point practically invisible, and undetectable in the average tube tester. However, when operated in a radio receiver at high plate voltages for some time the defect will show up. When the set is turned off, and the tubes permitted to cool before being turned on again, the cooling will cause a contraction of the elements which removes the trouble until a similar period of operation—sometimes several days—brings it on again.

"As an illustration of heat causing the elements to shift, I will mention a set of new tubes I had occasion to test a few days ago. The -80 had one filament shifted to one side. There was also quite a sag in the same, and as it heated the expansion caused it to sag more, until the filament shorted against the plate. Three out of five of the -27 tubes developed a grid-to-cathode short when allowed to remain in the tube tester for about three minutes, and upon examination I discovered that the heater element had warped and was causing the cathode to touch the grid at a point about half way down the heater element. However, when these tubes were cold the warp was imperceptible and the tubes tested okay. Needless to say they would cause trouble in almost any receiver.

"I wish to advise servicemen not to depend too much on tube testers to locate all tube troubles. There are many tube difficulties that do not show up for several minutes, or even hours after the tube has been in operation; and again they may never show up if the tubes are tested with different voltages from those applied in the radio receiver. I have several good tube testers, and have tested many tubes that were perfect as far as any conclusions justified by the tests were concerned, and yet, when placed in actual operation, they developed troubles and definite defects within a few hours.

"A principal source of trouble with new tubes is shifted elements in the -45 power tube, and would advise the most careful handling of the same. The elements of these tubes are so long and heavy that it requires a comparatively slight jar to cause a fatal shift. Also, we have found a good many tubes in which the element leads had not been soldered to the base prongs. Look for these loose connections when a loud signal causes the radio to develop suddenly a crackling noise, or intermittent reception. Also, if there should be considerable hum in sets employing the -80 rectifier tube, or a drop in volume, you may find an 'open' in one of the plates. Another source of grief, which we experienced for the first time this year, was soldering flux on the tube prongs. This grease was apparently a good insulator and gave trouble in re-

ceivers in which the socket contacts made contact on the side of the prong, well up toward the base of the tube. Those that contacted on the solder gave no trouble. We now wash all tube prongs with alcohol before testing and placing in stock. It saves trouble later on."

Tricks of the Radiola Trade

By H. Fred Pitzer

EVERY line of manufactured receivers has its own characteristics that recommend some particular methods of short-cutting to repairs. While Radiolas are not alone in this respect, they present some of the most intriguing cases ever encountered by the radio Philo Vance. And their very widespread usage justifies the compilation by the serviceman of the results of his experiences. I hope the following notes will help the serviceman to render better service on his next Radiola call. All current models, and the better known of the older types, are treated serially.

Oscillation Control on Models 16, 17, 41

Usually the grid resistors will suppress any undesirable oscillations in these models if they are of the correct size; *i.e.*, first stage, 800 ohms, second stage, 600 ohms. Substitution of higher values in an unstable receiver will result in weak reception over a good bit of the tuning range. The following methods are preferred, in the order they are presented. A 600-ohm resistor in series with the red, 135-volt, power pack lead will reduce the voltage applied to the r.f. stages. This resistor will be found in many of the 17's. A 600-ohm resistor shunted across the primary of the second or third r.f. stage will reduce oscillations, as will a short-circuited turn of wire placed near the offending coil. With the 41, I have found the shorted turn most effective. To apply this correctly, first try a turn of insulated wire with the ends unconnected. Place this single turn around each r.f. coil until the oscillating circuit is determined. Tighten in place where it prevents spilling over on the short wavelengths. If this does not take out the whistle, ground one end of the wire loop to the chassis. If oscillations still persist, connect the ends of the wire loop together, and insert under the offending coil just far enough away to produce the desired result. These adjustments should be made with the volume on full, and at a low wavelength.

A Few Common Bugs

No "B" voltage at pack. Burned-out voltage divider.

Model 17

No "B" voltage at sockets; pack okay. Shorted a.f. by-pass condenser.

No "B" voltage at detector. Shorted plate-cathode by-pass condenser.

Loud hum other than unbalanced c.t. Shorted –26 filament by-pass condenser.

Lack of volume; no detector voltage. Open grid resistor.

Enough voltage to operate a –45 may be obtained by connecting a 2 or 4 mfd. condenser from the –80 filament to the center tap of the secondary of the power transformer. If a –45 is used, don't forget to change over the "C" bias from the –71 center tap to the –27 leads which will be used for filament supply.

Model 18

Same as the first three on Model 17.

Noisy. Partially shorted a.f. by-pass condenser.

Oscillation. Compensating screw (located between the first and second tuning condensers) screwed in too far.

Adjust to short wave.

Everything tests okay, but no signal. Shorted output condenser. Test by inserting phones in –71 plate lead, which should provide a signal.

Models 33 and 41

As above, excepting that there are a few bugs in the power pack of the 41. If the fuses blow when the 41 is turned on, the rectifier stacks in the speaker are shorted and must be replaced. This can be ascertained by measuring the resistance of each section, remembering that each stack is composed of two rectifiers connected in series, the two stacks being connected in parallel. Reverse connection and take the highest reading, which should be over 1,000 ohms per section. Below this reading they will hum and should be replaced. When testing the speaker, only one side of the moving coil should show ground. Due to the great labor of replacing the condenser block in the 41, it it is advisable to blow open any section founded shorted, if it will blow. Usually it is the "C" by-pass condenser that shorts. When the short is located, isolate it from the circuit, and clip two 110-volt a.c. leads across the terminals. This will usually open the condenser. If it will hold a charge for three minutes, it may be used again in the receiver. An intermittent hum in the 41 can be cured by temporarily shorting from plus "B" power or plus 45 to minus "B" with a screwdriver while the set is operating. This short should be only momentary, and should be repeated several times.

Refinishing Model 33 Metal Cabinets

To match the coloring of the RCA 33 cabinet, use burnt amber or burn sienna, singly or mixed, to give the desired shade with shellac or japan. If preferred, these colors can be purchased ground in japan. Cover the section to be finished with the correct shade, and when dry give it a coat of plain lacquer, and finish with a hand rub just before it is dry. A little experience will produce results similar to new.

Improving the Bass on the 33 and 41

The lower frequencies may be emphasized on these models by inserting a condenser of suitable size between the plate of the first audio tube and the chassis ground. A .004 mfd. condenser is about right. If desirable, a switch can be installed in one of the leads, so that either tone may be selected. The higher value the condenser, the more the bias.

Bug Chasing in the 44 and 46

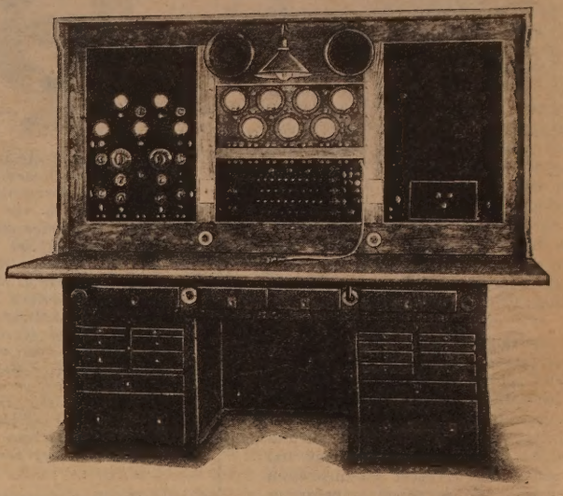
Oscillation is generally caused by dirty shield joints. This refers to both tube and r.f. coil shields. These shields must be on tight, and the clamps must fit tightly over the condenser shaft. A poor ground is a similar offender in this respect. If volume is lacking on the local position of the aerial switch, take the ground wire off the radiator, switch plate or bed spring, and put it where it belongs —on the water pipe in the cellar.

Noise when turning the station selector, but no noise after the station is tuned in, comes from a loose or dirty spring washer at the drum end of the variable condenser assembly. This assembly may be taken apart without removing the chassis, merely by driving out the tapered pin on the shaft, and drawing the dial mechanism sufficiently far off the shaft to allow the contacts to be cleaned. This is the most common 44 and 46 trouble, and the most difficult to cure by any other means.

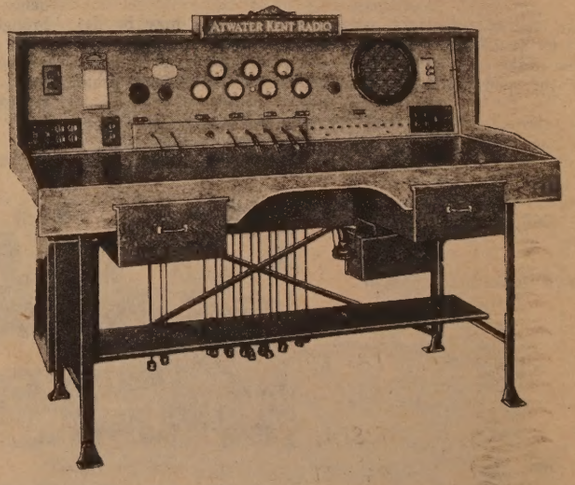
"C" bias readings on the –45 tube in the 44, 46, 47, 66 and 67 will not *read* more than 12 volts due to the 1 megohm resistor in the circuit.

Inoperation of these receivers is generally due to a short between resistors in the power pack, an open in the vitreous resistors, or a broken wire in the chassis. This chassis is unusually free from typical chassis troubles.

Sometimes the hum in the 46 rises to an annoying degree when a station is tuned in, but is absent between stations. When this occurs, make the following change: On the –80 socket remove that green wire that checks through to the yellow filter reactor lead. This lead will be found on the extreme end of one of the vitreous resistors. Take this green wire and resolder it to the red wire found on one corner tab of the condenser block. (This red wire also leads to the filter reactor.) Solder a wire on the resistor lug to which the yellow lead is connected, and short this over to the adjacent lug to which a red wire will be found connected. This operation results in adding a choke to the detector "B" supply, while the last directed operation takes out the resistance value added by the choke, the voltages to receiver remaining the same. This is very effective.



Willard W. Geiger, of Mt. Pocono, Pa., built the interesting test panel pictured above. The left hand panel contains a modulated oscillator, a vacuum tube voltmeter, a grid-dip meter and a wavemeter. Magnetic and dynamic speakers are located above middle panel. Tube sockets are at right



This interesting Atwater Kent test bench was designed by the Columbus Ignition Co., Columbus, O. Test leads, used for aerial, ground, speaker, continuity and meter leads, operate in conjunction with pulleys. Other features are battery binding posts, at right, a.c. and d.c. convenience outlets, speaker jacks and sockets and tool and tube drawers

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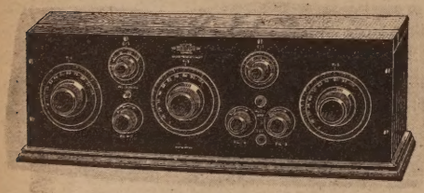

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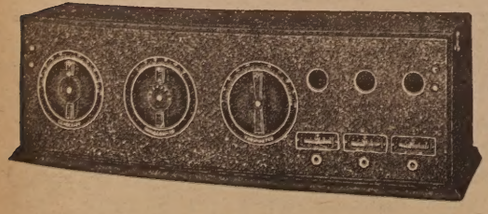

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ALL TRANSACTIONS KEPT PRIVATE. JUST THE SELLER AND I WILL KNOW THE DETAILS.

CALL (815) 964-8199

WANTED

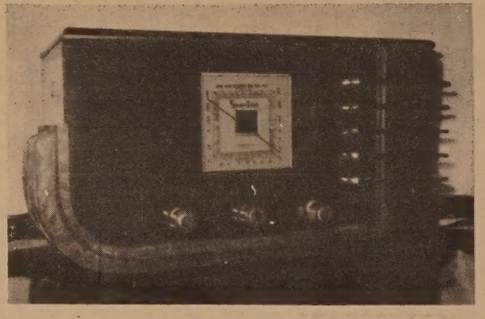
AUTOMOTIVE RADIO ITEMS: VIBRATORS, original radios, cable heads, power tuner types, misc. cash paid. trade 1927 QST's. Marvin Roth, 14500 LaBelle, Oak Park, MI 48237.

WANTED Cabinets for following radios: Federal 135, panel is 17-3/8" H, 11" wide. Cabinet for Grebe Synchrophase, its panel is 7 inches high and 19-3/8 wide. Cabinet for Kolster model D-6. Need Federal #35 R.F. transformer. Ralph G. Maddox, Purgitsville, WV 26852. Tel. (304) 289-3069.

HI-FI, TAPE, AUDIO, and radio retail magazines and brochures: 1930-1935; Regency FM; early 1950's transistor sets. Have trade items. H. Layer, AV-SFSU, 1600 Holloway, San Francisco, CA 94132.

WANTED : CORRESPONDENCE WITH anyone having English or French make of radios, 1920-1931 era. Also information on source for various diameter resistance wire as used in older bleeder rheostats, etc. DARCY BROWNRIGG, CHELSEA, QUEBEC, J0X 1N0 CANADA.

WANTED



PLEASE HELP. I love mirrored glass radios. If you have one, or know where there is one, please let me know. I'm also interested in any "wild looking" radios from the 1930's like colored celluloid radios (Fada, Emerson, etc.) and chrome radios. Barbara Gorton, Box 1252, Dayton, OH 45401. (513) 253-5073.

WANTED FOR DISPLAY: Scanning disc television, Patsy Hicken, WCSC Broadcast Museum, 80 Alexander Street, Charleston, S.C. 29402. (803) 723-8371.

RAYTHEON TELEVISOR LAMP FOR JENKINS Scanning Disc TV. Top price paid for scanners. Bill Russell, 6463 1/2 Fulton Ave. Van Nuys, CA 91401 (213) 989-4086.

WANTED

WANTED CATHEDRAL CABINET FOR Grebe 7 tube superhet also horn for Magnavox type R3B driver (and/ also) driver and base for AK model "L" horn - Have for sale or trade model AK20, small, good chassis less tubes - and RCA model 100 speaker and Crosley cathedral cabinet only - Avery Leuty, US 50 East, Salem, IL 62881. (618) 548-1112.

WANTED: 1928-1940 THEATER Horns and Drivers, particularly W-E and RCA. Shearer Two-Way Theater Speaker. Cinaudagraph PE-27 and others. W-E 26A Multi-cell. Rayleigh Disc. Rola Horn Speaker. Rola "Pedestal" Cone Speaker. W-E 713-A H.F. Driver. Call (501) 777-6751. Jim Hunter, % Klipsch and Assoc., P. O. Box 688, Hope, AR 71801.

WANTED: BREADBOARDS -- 4 TUBES or less. Anything pre 1922. What have you got?? Postage refunded. Ray Garner, Rt. 10, Box 645M-1, Ft. Worth, TX 76135.

WANTED: GENERAL ELECTRIC NE-18 2 watt bulbs. Also scanning discs. 3 - stage resistance coulped amplifiers. Darcy Brownrigg, Chelsea, Quebec, J0X 1N0, Canada.

PUETT ELECTRONICS

PUBLISHERS OF P.O. BOX 28572 DALLAS TEXAS 75228

ANTIQUE RADIO TOPICS & THE CLASSIC RADIO NEWSLETTER

LIST N/19

HOW TO ORDER - (1) MAKE ALL CHECKS OR MONEY ORDERS PAYABLE TO PUETT ELECTRONICS. ALL PAYMENTS MUST BE IN U.S. FUNDS AND NEGOTIABLE WITHOUT PAYMENT OF A BANK COLLECTION FEE. MONEY ORDERS ISSUED BY POST OFFICES IN CERTAIN COUNTRIES (CANADA FOR EXAMPLE) ARE ACCEPTABLE IF THEY CAN BE CASHED IN A U.S. POST OFFICE.

(2) ALL ORDERS ARE POSTPAID AND INSURED. THE PRICE OF ALL ITEMS INCLUDES POSTAGE AND INSURANCE CHARGES. SEE ORDER BLANK ON OTHER SIDE.

(3) TEXAS RESIDENTS ADD 5% STATE SALES TAX. --- (4) YOU CAN USE YOUR MASTER CARD OR VISA TO CHARGE YOUR PURCHASES. VISA CUSTOMERS SEND YOUR ACCOUNT NUMBER AND EXPIRATION DATE. MASTER CARD CUSTOMERS SEND YOUR ACCOUNT NUMBER, INTER BANK NUMBER AND EXPIRATION DATE.

YOU MAY CALL J.W.F. PUETT AT HIS RESIDENCE BETWEEN THE HOURS OF 9:00 AM and 10:00 PM CENTRAL STANDARD OR CENTRAL STANDARD DAYLIGHT TIME FOR FREE TECHNICAL CONSULTATION - (214) 327-8221 or 321-0927.

MasterCard VISA

ANTIQUE RADIO TUBES

ALL TUBES ARE GUARANTEED - SEE TERMS OF GUARANTEE STATED IN OUR CATALOG.

0A2	$3	1H4	$6	2A4	$8	6A5	$6	6B6	$6	6J8	$6	6SR7	$5	7B5	$6	12AH7	$5	12SN7	$4
0A3	$3	1H5	$6	2A5	$7	6A6	$5	6B7	$7	6K5	$5	6SS7	$5	7B6	$6	12AT6	$4	12SQ7	$5
0A4	$3	1H6	$6	2A6	$7	6A7	$9	6B8	$7	6K6	$5	6ST7	$5	7B7	$7	12AT7	$4	12SR7	$5
0B3	$4	1J5	$6	2A7	$6	6A8	$7	6BA6	$3	6K7	$6	6SU7	$5	7B8	$6	12AU6	$3	12SW7	$5
0C3	$4	1J6	$6	2B7	$6	6AB4	$4	6BE6	$4	6K8	$6	6SV7	$5	7C5	$5	12AU7	$5	12V6	$4
0D3	$4	1L4	$6	2E5	$10	6AB5	$12	6B36	$4	6L5	$6	6S27	$5	7C6	$8	12AV6	$4	12Z3	$4
0Y4	$4	1L6	$12	2W3	$4	6AB7	$6	6C4	$4	6L6	$5	6T7	$6	7C7	$6	12AX7	$4	14A4	$6
0Z4	$5	1LA4	$7	2X2	$5	6AC5	$4	6C5	$4	6L7	$8	6T8	$3	7E6	$6	12AY7	$4	14A5	$6
1A3	$6	1LA6	$6	3A4	$5	6AC7	$6	6C6	$7	6N5	$12	6U5	$12	7E7	$6	12B7	$6	14A7	$6
1A4	$6	1LB4	$7	3A5	$5	6AD5	$7	6C7	$7	6N6	$6	6U6	$4	7F7	$12	12B8	$6	14AF7	$6
1A5	$5	1LC5	$6	5A8	$6	6AD6	$9	6C8	$6	6N7	$6	6U7	$7	7F8	$9	12BA6	$4	14B5	$6
1A6	$5	1LC6	$6	3B5	$5	6AD7	$6	6CB6	$3	6P5	$5	6V6	$3	7G7	$7	12BE6	$4	14B6	$6
1A7	$4	1LD5	$6	3B7	$5	6AE5	$5	6D4	$5	6P7	$6	6V7	$5	7H7	$6	12C5	$5	14B8	$6
1B4	$6	1LE3	$6	3C6	$6	6AE6	$6	6D6	$7	6Q7	$6	6W6	$4	7J7	$7	12C8	$6	14C5	$5
1B5	$6	1LF3	$6	3LF4	$6	6AE7	$6	6D7	$7	6R7	$6	6X4	$4	7K7	$8	12E5	$5	14C7	$6
1B7	$6	1LG5	$6	3Q4	$5	6AF5	$6	6D8	$7	6S4	$5	6X5	$4	7L7	$7	12H6	$6	14E6	$6
1C5	$4	1LH4	$6	3Q5	$5	6AF6	$9	6E5	$12	6S7	$6	6Y6	$5	7N7	$10	12J5	$6	14E7	$6
1C6	$5	1LN5	$6	3S4	$6	6AG5	$4	6E6	$5	6S8	$7	6Z4	$6	7Q7	$6	12J7	$5	14F7	$7
1C7	$6	1N5	$6	5V4	$5	6AG7	$5	6E7	$7	6SA7	$5	6Z5	$6	7R7	$6	12K7	$6	14F8	$8
1D5	$6	1N6	$6	5AZ4	$8	6AH5	$5	6E8	$7	6SB7	$6	6Z7	$6	7S7	$7	12K8	$6	14H7	$6
1D7	$6	1P5	$5	5R4	$5	6AH7	$5	6F5	$6	6SC7	$6	6ZY5	$6	7V7	$6	12L6	$4	14J7	$7
1D8	$6	1Q5	$5	5T4	$5	6AK5	$3	6F6	$6	6SD7	$5	7A4	$6	7W7	$6	12Q7	$6	14N7	$6
1E4	$5	1R4	$6	5U4	$5	6AL5	$4	6F7	$7	6SE7	$5	7A5	$5	7X6	$7	12SA7	$5	14Q7	$6
1E5	$6	1R5	$3	5V4	$5	6AL7	$9	6F8	$5	6SF5	$5	7A6	$6	7X7	$7	12SB7	$6	14R7	$6
1E7	$6	1S4	$4	5W4	$5	6AQ5	$4	6G5	$12	6SF7	$5	7A7	$6	7Y4	$6	12SC7	$6	14W7	$6
1F4	$6	1S5	$4	5X4	$5	6AQ7	$5	6G6	$5	6SG7	$6	7A8	$6	7Z4	$6	12SF5	$5	14X7	$7
1F5	$6	1T4	$5	5Y3	$4	6AT6	$4	6H6	$5	6SH7	$5	7AD7	$6	10	$9	12SF7	$5	15	$9
1F6	$6	1T5	$5	5Y4	$5	6AT8	$3	6H8	$3	6SJ7	$5	7AE7	$6	12	$8	12SQ7	$6	19	$7
1F7	$6	1U4	$5	5Z3	$5	6AU6	$3	6J4	$5	6SK7	$5	7AF7	$8	12A5	$6	12SH7	$5	19T8	$3
1G4	$6	1U5	$5	5Z4	$5	6AV6	$4	6J5	$6	6SL7	$5	7AG7	$6	12A6	$6	12SJ7	$5	20	$9
1G5	$6	1V	$6	6A3	$6	6B4	$6	6J6	$5	6SN7	$5	7AH7	$6	12A7	$7	12SK7	$5	22	$8
1G6	$6	2A3	$10	6A4	$7	6B5	$7	6J7	$6	6SQ7	$5	7B4	$6	12A8	$6	12SL7	$5	24A	$7
25A6	$6	36	$8	59	$9	1201	$6												
25A7	$6	37	$6	70A7	$7	1203	$6												
25AC5	$6	38	$6	70L7	$8	1231	$6												
25B6	$6	39	$6	71A	$9	1232	$7												
25C6	$6	40	$9	75	$8	1273	$6												
25L6	$6	40Z5	$5	76	$5	1274	$6												
25S	$6	41	$6	77	$7	1281	$6												
25Z5	$6	42	$6	78	$8	1291	$6												
25Z6	$6	43	$7	79	$6	1294	$6												
26	$7	44	$6	80	$5	1629	$9												
26A6	$6	45	$10	81	$9	1852	$6												
26A7	$6	45Z3	$3	82	$7	1853	$6												
27	$7	45Z5	$4	83	$7	5881	$7												
28D7	$4	46	$6	83V	$7	6146	$7												
30	$7	47	$6	84	$6	9001	$5												
31	$6	48	$8	85	$6	9002	$5												
32	$6	49	$8	89	$6	9003	$5												
32L6	$4	50	$9	117L7	$9	9006	$6												
33	$6	50A5	$6	117M7	$9	VR75	$4												
33	$6	50B5	$4	117N7	$8	VR90	$4												
34	$6	50C5	$3	117P7	$8	VR105	$4												
35	$7	50C6	$7	117Z3	$6	VR150	$4												
35A5	$6	50L6	$5	117Z4	$6	VT-52	$7												
35B5	$5	50X6	$6	117Z6	$6	FM1000	$9												
35C5	$4	50Y6	$6	485	$7	XXB	$6												
35L6	$5	50Y7	$6	717A	$9	XXD	$6												
35W4	$5	51	$7	879	$5	XXL	$6												
35Y4	$6	53	$15	884	$8	XXFM	$7												
35Z3	$6	55	$8	950	$8														
35Z4	$6	56	$6	951	$8														
35Z5	$5	57	$7	955	$7														
36	$6	58	$8	958	$7														

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(3) The Complete Restoration of AC Powered Antique Radios by J.W.F.P.
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MAY

THE HORN SPEAKER

1981

"Alice: Oh, oh, oh, I'll die! He said Bailer, but he got it wrong, it's Taylor, it's Frank! It must be Frank. Oh, oh! ——"

LEE H DAVIS
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SUMNER WA-98390